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Prince William Sound Area King and Tanner Crab Review, 2004

by

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Alaska Department of Fish and Game

Divisions of Sport Fish and Commercial Fisheries



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Weights and measures (metric)		General		Measures (fisheries)	
centimeter	cm	Alaska Administrative		fork length	FL
deciliter	dL	Code	AAC	mideye-to-fork	MEF
gram	g	all commonly accepted		mideye-to-tail-fork	METF
hectare	ha	abbreviations	e.g., Mr., Mrs., AM, PM, etc.	standard length	SL
kilogram	kg			total length	TL
kilometer	km	all commonly accepted			
liter	L	professional titles	e.g., Dr., Ph.D., R.N., etc.	Mathematics, statistics	
meter	m	at	@	<i>all standard mathematical</i>	
milliliter	mL	compass directions:		<i>signs, symbols and</i>	
millimeter	mm	east	E	<i>abbreviations</i>	
		north	N	alternate hypothesis	H _A
		south	S	base of natural logarithm	<i>e</i>
		west	W	catch per unit effort	CPUE
		copyright	©	coefficient of variation	CV
		corporate suffixes:		common test statistics	(F, t, χ^2 , etc.)
		Company	Co.	confidence interval	CI
		Corporation	Corp.	correlation coefficient	
		Incorporated	Inc.	(multiple)	R
		Limited	Ltd.	correlation coefficient	
		District of Columbia	D.C.	(simple)	r
		et alii (and others)	et al.	covariance	cov
		et cetera (and so forth)	etc.	degree (angular)	°
		exempli gratia		degrees of freedom	df
		(for example)	e.g.	expected value	<i>E</i>
		Federal Information		greater than	>
		Code	FIC	greater than or equal to	≥
		id est (that is)	i.e.	harvest per unit effort	HPUE
		latitude or longitude	lat. or long.	less than	<
		monetary symbols		less than or equal to	≤
		(U.S.)	\$, ¢	logarithm (natural)	ln
		months (tables and		logarithm (base 10)	log
		figures): first three		logarithm (specify base)	log ₂ , etc.
		letters	Jan,...,Dec	minute (angular)	'
		registered trademark	®	not significant	NS
		trademark	™	null hypothesis	H ₀
		United States		percent	%
		(adjective)	U.S.	probability	P
		United States of		probability of a type I error	
		America (noun)	USA	(rejection of the null	
		U.S.C.	United States	hypothesis when true)	α
			Code	probability of a type II error	
		U.S. state	use two-letter	(acceptance of the null	
			abbreviations	hypothesis when false)	β
			(e.g., AK, WA)	second (angular)	"
				standard deviation	SD
				standard error	SE
				variance	
				population	Var
				sample	var
Weights and measures (English)					
cubic feet per second	ft ³ /s				
foot	ft				
gallon	gal				
inch	in				
mile	mi				
nautical mile	nmi				
ounce	oz				
pound	lb				
quart	qt				
yard	yd				
Time and temperature					
day	d				
degrees Celsius	°C				
degrees Fahrenheit	°F				
degrees kelvin	K				
hour	h				
minute	min				
second	s				
Physics and chemistry					
all atomic symbols					
alternating current	AC				
ampere	A				
calorie	cal				
direct current	DC				
hertz	Hz				
horsepower	hp				
hydrogen ion activity	pH				
(negative log of)					
parts per million	ppm				
parts per thousand	ppt, ‰				
volts	V				
watts	W				

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2004**

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ABSTRACT

The Prince William Sound (PWS) Registration Area E includes the territorial waters of Alaska from the longitude of Cape Suckling to the longitude of Cape Fairfield and extending 3 nautical miles offshore. The Alaska Department of Fish and Game (ADF&G) is responsible for the management of commercial, personal use, and subsistence shellfish fisheries within the registration area. In addition, ADF&G assumes management authority of king crab and Tanner crab fisheries within federal waters of the exclusive economic zone (EEZ), extending from 3–200 nautical miles offshore.

Waters of the PWS Management Area once supported commercial and non-commercial Tanner crab fisheries. The commercial Tanner crab *Chionoecetes bairdi* fishery began in the late 1960's, peaked at nearly 14 million pounds during the 1972–1973 season and then decreased until 1988. Due to low abundance, ADF&G closed the commercial Tanner crab fishery by emergency order authority from 1989 until 1999. ADF&G also issued emergency orders for partial closures of the non-commercial Tanner crab fisheries during this time. The collapse of the PWS Tanner crab stock may be attributed to factors of fishing mortality and environmental conditions. In 1999, the Alaska Board of Fisheries (BOF) adopted a regulatory closure of all Tanner crab fisheries to facilitate rebuilding of the stock. ADF&G assessment surveys using pot gear from 1977–1991 and trawl gear since 1991, documented the decline of Tanner crab populations within PWS. The abundance estimate of 15,639 legal male Tanner crab (crab with a carapace width ≥ 5.3 inches (135 mm)) from the 2003 survey is the fourth lowest since the inception of the trawl survey. It is critical to protect the entire PWS population in order to maximize Tanner crab reproductive potential when environmental conditions are favorable.

Red *Paralithodes camischaticus*, blue *Paralithodes platypus* and golden or brown *Lithodes aequispina* king crab species occur in the PWS area and commercial harvests date to 1957. Strong commercial harvests occurred in the early 1960's, peaked at 296,200 pounds in 1972 and decreased until 1988. Due to low king crab abundance, ADF&G closed all commercial fishing by emergency order during 1989–1990, and from 1992–1994. In 1999, the BOF adopted a regulatory closure of all king crab fisheries. In past years ADF&G has not had the means to assess king crab stocks. However, in March 2004 ADF&G initiated a survey to index the relative abundance and monitor the stock status of golden king crab in Western PWS. One hundred and fifty eight commercial king crab pots were fished in a systematic grid pattern throughout lower and central Knight Island Passage to capture 128 male and 170 female crabs. Funding for the study is presently limited to two years and results of the second survey will be reported under a separate cover. However, ADF&G intends to pursue funding for future surveys.

Key words: assessment, Board of Fisheries, Prince William Sound, Tanner crab, king crab, harvest, management.

INTRODUCTION

The Alaska Department of Fish and Game (ADF&G) Prince William Sound (PWS) Management Area (Area E) includes waters of PWS and the Gulf of Alaska bounded by the longitudes of Cape Suckling (143° 53'W) on the east and Cape Fairfield (146°50'W) on the west (Figure 1). Because of low abundance, the Alaska Board of Fisheries (BOF) adopted regulations in March of 1999 to close commercial, sport, personal use, and subsistence harvests of king and Tanner crabs in all waters of PWS and the adjacent Gulf of Alaska. This report summarizes past commercial fisheries for Tanner *Chionoecetes bairdi*, red king *Paralithodes camischaticus*, blue king *Paralithodes platypus*, and golden or brown king *Lithodes aequispina* crabs within Area E. This report also reviews current assessment information, as well as past management actions taken to conserve these crab resources (Berceli et al. 2002).

TANNER CRAB

Proposal 414. Establish a commercial Tanner crab fishery.

Proposal 418. Establish a personal use Tanner crab fishery.

HISTORICAL BACKGROUND

The PWS commercial Tanner crab fishery began in 1968 when 1.2 million pounds were landed (Table 1). The harvest peaked in 1972–1973 at 13.9 million pounds, prior to the 1976 adoption of a minimum legal carapace width. Harvests decreased during the late 1970s and early 1980s, followed by district closures during 1984 and 1985. Small postrecruit fisheries during 1986 to 1988 yielded relatively stable harvests of approximately 0.5 million pounds (Table 1, Figure 3). However, harvests declined dramatically in the Western District with no catches occurring in the Eastern District.

Plausible explanations for the collapse of Tanner crab stock within PWS include factors related to fishing mortality and environmental conditions. Overharvest of all stock segments may have occurred prior to the 1976 adoption of a male-only restriction and a minimum carapace size limit of 5.3 inches. For example, the 3.8 million pound harvest in 1974–1975 included 2.7 million pounds of crab smaller than the current minimum size limit (Donaldson 1991). The legal male segment of the stock may have been overharvested because early fisheries were limited by regulatory season length rather than an abundance based guideline harvest level. Handling mortality of undersized and female crab may have contributed to the stock decline, particularly during fishing seasons of seven months duration. Finally, changes in environmental conditions may have caused greater mortality of Tanner crab larvae, impaired growth and reproduction, and coincided with increased production of crab predators such as gadoid fishes.

PWS is divided into four Tanner crab management districts (Figure 2). The Northern and Hinchinbrook Districts include most of the waters inside PWS proper, while the Eastern and Western Districts encompass waters of the Gulf of Alaska and southwestern PWS. Historically, the commercial Tanner crab harvest was equally divided between the Gulf of Alaska and PWS portions of the management area.

Registration for the PWS Tanner crab fishery is "superexclusive". This designation means that a vessel registered to fish Tanner crab in PWS may not participate in any other Tanner crab fishery within the state during that registration year. Conversely, a vessel registered to fish in another registration area may not fish in PWS during that registration year.

Other regulations distinctive to the PWS Tanner crab fishery include: a gear limit not to exceed 75 king and Tanner pots per vessel; a buoy tag requirement; harvest restricted to male crab; and a minimum legal carapace width of 5.3 inches (135 mm) for all retained crab. Past regulatory fishing seasons opened January 15 and closed March 31.

Historically, sport, personal use, and subsistence Tanner crab fisheries remained open on a year around basis throughout most of PWS. Despite low and declining abundance estimates, daily bag and possession limits remained at 20 male crab. Minimum legal size differed by fishery; 5.3 inches (135 mm) for personal use and subsistence fisheries and 5.5 inches (140 mm) for sport fisheries. Legal gear types for sport and personal use fishing included pots, ring nets, dive gear, dip nets, and hooked or hookless hand lines. Pot gear was limited to 5 pots per person and 10 pots per vessel for all non-commercial crab fisheries and all pots were required to have a biodegradable escape mechanism. However, legal gear for the subsistence harvest of Tanner crabs was broadly defined and included any gear type defined in regulation 5 AAC 39.105.

There was no mechanism to directly monitor effort or harvest of Tanner crab in historical non-commercial fisheries. Data from the Division of Sport Fish statewide harvest survey

(SWHS, Howe et al. 2001) indicated a harvest range of 137 to 537 crab, with an average annual harvest of 300 Tanner crab during the years 1994 to 1998 (ADF&G *unpublished*). Limited data developed through household interviews by ADF&G Subsistence Division staff suggested that subsistence harvests totaled less than 4,900 Tanner crab among all PWS communities in 1997 (ADF&G 1999).

STOCK STATUS AND MANAGEMENT MEASURES

ADF&G has conducted assessment programs for Tanner crab within the Prince William Sound Management Area since 1977 (Berceli et al. 2002). Surveys were conducted with pot gear through 1991 (Donaldson 1991). Pot survey objectives were to provide indices of legal and sublegal (crab with a carapace width < 5.3 inches (135 mm)) male Tanner crab and to monitor reproductive success of female Tanner crab. This information was used to determine relative stock condition, as well as to set preseason harvest guidelines for the commercial fishery. Pot survey data indicate steady declines in the numbers of male and female Tanner crab (Table 2). During the pot survey time series, the mean catch rate of Tanner crab decreased 86 percent.

Recognizing the inherent weaknesses of pot surveys, such as soak variation and the relative nature of the indices, ADF&G implemented trawl surveys in 1991 (Kimker and Trowbridge 1992; Bechtol 1999). An advantage of trawl surveys is that population abundance estimates can be generated by using an area swept equation. Trawl surveys are also used by the National Marine Fisheries Service for the Bering Sea surveys and by ADF&G to assess crab stocks in other management areas.

Population estimates generated from ADF&G trawl surveys demonstrate that PWS Tanner crab remain depressed (Figure 4). Estimated abundance of legal male crab in the Northern and Hinchinbrook Districts decreased 97% from 108,624 in 1993 to 3,362 in 1999 (Table 3). This decline resulted from poor recruitment to the legal segment of the stock, likely due to successive weak prerecruit classes and skip molting in the prerecruit-1 (male crab with a carapace width between 113–134 mm) and smaller size classes. Abundance estimates generated from the 2003 survey indicated modest increases in the recruit and prerecruit-1 size classes relative to recent surveys. However, the 2003 legal male population estimate of 15,639 Tanner crab is far below historical levels. The 2003 estimate of total males suggests the low likelihood of a stock increase (Figure 5). In addition to the traditional survey stations located north of Montague Island and within Orca Bay and its proximity, tows conducted in other areas of PWS suggest that the Tanner crab stock remains low throughout most of PWS (Figure 6, Figure 7, Figure 8).

In March of 1999, the BOF adopted regulations to close commercial, sport, personal use, and subsistence fisheries for Tanner crab in all waters of the PWS area. ADF&G closed commercial and subsistence fisheries for Tanner crab by emergency order within the Hinchinbrook Entrance and Orca Bay portions of PWS in 1982 and the personal use fishery in these areas in 1987. Waters of Orca Bay and the area off the north end of Montague Island are key production areas that have historically provided newly mature male and female Tanner crabs. In order to rebuild the stock and provide protection to juvenile and newly mature crabs, the Orca Bay area has been closed since 1982 and the north Montague area has been closed to all harvest of Tanner crabs since 1991.

The legal male portion of the Tanner crab stock remains depressed far below historical levels. Recent studies have indicated the importance of large male crab to mating large females, the most fecund component of the population (Paul and Paul 1996). Because of the lack of

understanding of larval sources and the role that local aggregations play in rebuilding the crab population, it is critical to protect the entire PWS population in order to maximize Tanner crab reproductive potential when environmental conditions are favorable.

KING CRAB

Proposal 415. Establish a commercial king crab fishery.

Proposal 417. Establish a personal use king crab fishery.

HISTORICAL BACKGROUND

Red, blue and golden king crabs are found in PWS. Red king crab are sparsely distributed throughout PWS, with historic concentrations occurring in the eastern Sound and Hinchinbrook Entrance (Figure 1). Blue king crab are found in the Port Wells and Harriman Fjord areas; small aggregations may also occur in other glacial fjords of western PWS. Golden king crab are found in central and western PWS at depths of 150–400 fathoms. Waters in the Gulf of Alaska portion of the management area have no documented concentrations of king crab, except for a sparse distribution of golden king crab.

PWS is a superexclusive registration area for king crab. Harvest is restricted to males only with minimum legal carapace widths of 7.0 inches (178 mm) for red and golden king crabs, and 5.9 inches (150 mm) for blue king crab. Past regulatory seasons provided two open periods: October 1 to December 20 and January 15 to March 15.

Commercial harvests of king crab from PWS date to 1957 when 300 lb were landed (Kaydas and Kopppen, 1957). However, the fishery rapidly developed and the area's second highest harvest of 246,965 pounds was landed 1960 (Table 4). Catch reporting by king crab species did not begin until the 1979–1980 season. The 1972 harvest of 296,200 pounds is believed to have been primarily blue king crab. During 1979 to 1984, stocks of both blue and red king crabs declined and commercial fisheries for both species remained closed from the 1984–1985 season through the 1990–1991 season. The closures coincided with development of the golden king crab fishery from 1982–1989 (Figure 9).

The golden king crab stock proved to be relatively small, as indicated by fishery catch per unit of effort data coupled with rapid declines in average weight, size, and geographic distribution. In 1988, the Alaska Board of Fisheries adopted a guideline harvest range (GHR) of 40,000 to 60,000 pounds for golden king crab. The GHR was adopted to help stabilize declines in average size, weight, and distribution observed in the legal segment of the golden king crab stock since the fishery began 1982. The GHR was apparently established too late because the 1990–1991 and 1991–1992 fisheries failed to attain the low end of the range. The commercial golden king crab fishery was closed in 1992, but reopened for a month during the 1994–1995 season. Harvests during this opening, although confidential due to the small number of participants, were low.

The historical non-commercial king and Tanner crab fisheries shared many similarities. The fisheries remained open year around despite declines in abundance, legal gear, and gear limits were identical with legal subsistence gear types more liberal than for other non-commercial fisheries. The daily bag and possession limit for all non-commercial fisheries was 6 king crab and minimum legal sizes were identical to those set for commercial fisheries.

There was no mechanism in place to directly monitor the effort or harvest in the non-commercial king crab fisheries of PWS. Prior to the fishery closure in 1999, data from the Division of Sport Fish SWHS indicated a harvest of 40 king crab in 1997 and 72 king crab in 1998 (ADF&G *unpublished*). Limited data developed through household interviews by ADF&G Subsistence Division staff suggested that subsistence harvests totaled less than 150 king crab among all PWS communities in 1997 (ADF&G 1999).

STOCK STATUS AND MANAGEMENT MEASURES

ADF&G does not assess blue king crab in PWS. Permit holders targeting blue king crab during the 1991–1992 season reported few sublegal (crab with a carapace width < 5.9 inches (150 mm)) male and female crabs. Increased recruitment from immigration is unlikely because even historic aggregations were small and widely dispersed.

The ADF&G has assessed the relative abundance of red king crab within the eastern portion of PWS in conjunction with Tanner crab surveys since 1977. The frequency of king crab captures is believed to be an index of their abundance. During the pot survey time series, king crab harvests ranged from a high of 193 crab in 1978 to 1 crab in 1987 (Table 2). Trawl surveys in traditional index stations over the past decade have demonstrated that red king crab populations remain depressed and are unlikely to recover in the near future.

In the past, ADF&G lacked the means to assess golden king crab stocks. A grant award and the recent acquisition of the R/V Solstice allowed ADF&G to initiate a survey of king crab in western PWS in March 2004. A total of 158 commercial king crab pots were fished in a systematic grid pattern throughout lower and central Knight Island Passage and yielded 298 golden king crab, 128 males and 170 females (Figure 10). Seventy-five percent of the male crab had carapace widths in excess of the 7 inch minimum size limit; 98% of the females were mature and 44% of the females carried eggs. All crab were released after being measured and 126 of the male crab were tagged prior to release. The primary goal of the ADF&G study is to develop a protocol for a fishery-independent pot survey to index and monitor stock status of golden king crab. In the future, the protocol could be applied to studying the abundance and distribution of the other king crab species in other areas of PWS. Once established, a standardized pot survey could be a relatively efficient method for continued stock monitoring. A secondary goal is to collect biological data sufficient to develop, if warranted, a preliminary harvest strategy for king crab within the region.

The blue and red king crab fisheries remained closed by emergency order following the 1991-1992 season which provided no indication of stock recovery. Trawl survey data suggest continued low stock levels for red king crab. Fishery performance data from the 1994–1995 golden king crab season demonstrated a continued low level of abundance, provided no indication of impending recruitment to the legal stock segment, and reported low harvests of sublegal (crab with a carapace width < 7.0 inches (178 mm)) male and female crabs. The commercial fishery for golden king crab has remained closed since the 1994–1995 season.

In March 1999, the BOF adopted a regulation to close all commercial and non-commercial fisheries for king crab in PWS due to demonstrated low stock levels and lack of stock status and non-commercial fishery harvest information.

CONCLUSIONS

Waters of the PWS Management Area once supported commercial, recreational and subsistence Tanner crab and king crab fisheries. Commercial fisheries of both Tanner and king crab species demonstrated strong harvests during the early years of fisheries development followed by precipitous harvest declines. Past regulatory measures were inadequate, or were enacted too late to curb the decline of crab stocks as evidenced by fishery performance. Explanations for the collapse of PWS crab stocks include factors related to fishing mortality and unfavorable environmental conditions.

ADF&G closed the commercial Tanner crab fisheries by emergency order authority for more than 10 years prior to the BOF regulatory closures adopted in 1999. Similarly, with the exception of a few limited area openings, ADF&G acted to protect juvenile and newly matured crab by closing non-commercial fisheries in key Tanner crab production areas of Orca Bay since 1982 and waters north of Montague Island since 1991.

The Tanner crab stock in the PWS area remains far below historical levels. ADF&G assessment surveys conducted with pot gear from 1977 to 1991 and trawl gear from 1991 to present, documented the decline of the Tanner crab stock. Abundance estimates of legal male Tanner crab in the Northern and Hinchinbrook Districts decreased 97% from 1993 to 1999. Results of the most recent trawl survey indicate continued low stock levels. It is critical to protect the entire PWS population in order to maximize Tanner crab reproductive potential when environmental conditions are favorable.

Despite partial and full area fishery closures, persistent low stock levels of king crabs suggests a continuing need to protect all stock components to allow recovery and capitalize on the available reproductive potential when conditions are favorable. ADF&G intends to continue monitoring Tanner crab via biennial trawl survey and will pursue funding to continue development of king crab assessments in PWS.

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TABLES AND FIGURES

Table 1.—Commercial Tanner crab harvests from the Prince William Sound Management Area, 1968–2004.

Season ^a	Vessels	Landings	Harvest by Area (lb)					Mean Weight (lb/crab)	Number of crab	Percent New-shell Recruits ^d
			Inside		Outside		Total			
1968-69								1,235,613		
1969-70								1,284,597		
1970-71								4,159		
1971-72								7,788,498		
1972-73								13,927,868		
1973-74			1,658,000		8,500,000			10,158,000		
1974-75			1,187,000		2,667,000			3,854,000		
1975-76			3,322,482		3,810,262			7,132,744		
</										

^a Closed from 1989 to present.^b New districts and minimum legal size established.^c Calendar year season established.^d New shell crab are less than year since its last molt with few or no scratches or growth of epifauna (such as barnacles) on the shell.

Table 2.—Tanner and king crab harvests by pot and trawl surveys of traditional stations in the Northern and Hinchinbrook Districts, Prince William Sound, 1997–2003.

Pot Survey Catch Abundance						
Year	Number of Pots	Female Tanner Crab	Male Tanner Crab	Total Tanner Crab (both sexes)	Mean Tanner Crab Per Pot	King Crab (both sexes)
1977	51	1,972	2,773	4,745	93.0	30
1978	146	1,099	6,376	7,475	51.2	193
1979	237	3,210	16,831	20,041	84.6	161
1980	240	2,092	11,012	13,104	54.6	103
1981	216	1,064	8,114	9,178	42.5	36
1982	224	849	4,734	5,583	24.9	30
1983	180	573	3,225	3,798	21.1	3
1984	178	610	3,440	4,050	22.8	18
1985	163	212	2,191	2,403	14.7	15
1986	168	570	2,473	3,043	18.1	18
1987	138	1,010	2,336	3,346	24.2	1
1988	119	750	1,195	1,945	16.3	2
1989	114	459	1,640	2,099	18.4	5
1990	109	255	1,336	1,591	14.6	5
1991	81	331	724	1,055	13.0	23

Trawl Survey Catch Abundance						
Year	Number of Tows	Female Tanner Crab	Male Tanner Crab	Total Tanner Crab (both sexes)	Mean Tanner Crab Per Tow	King Crab (both sexes)
1991	35	1,786	1,884	3,670	104.9	0
1992	38	1,514	1,783	3,297	86.8	2
1993	38	761	1,254	2,015	53.0	2
1994	38	905	1,098	2,003	52.7	2
1995	33	358	534	892	27.0	0
1996	Biennial survey schedule initiated, no survey					
1997	37	341	380	721	19.5	1
1998	No Survey					
1999	33	138	183	321	9.7	1
2000	No Survey					
2001	34	1,864	1,307	3,171	93.3	0
2002	No Survey					
2003	40	912	962	1,874	46.9	0

Table 3.—Tanner crab population abundance estimates from trawl surveys of traditional survey stations in the Northern and Hinchinbrook Districts of Prince William Sound, 1991–2003.

<u>Males</u> Size (mm)	Shell Age	Year ^a								
		1991	1992	1993	1994	1995	1997	1999	2001	2003
<u>Pre-recruit</u>										
< 73	New	620,890	522,363	406,364	581,695	249,368	214,853	121,162	1,005,288	477,427
73–92	New	537,060	287,565	95,881	70,772	31,681	56,792	7,558	292,830	116,768
93–112	New	215,572	367,261	98,978	34,103	16,820	32,361	3,131	136,488	99,043
	Old	40,529	90,965	92,826	85,066	46,709	16,946	22,521	33,794	101,205
113–134	New	70,933	135,806	108,525	18,154	4,797	10,161	1,300	24,506	34,173
	Old	145,542	158,309	134,404	155,455	79,397	22,852	15,782	22,943	57,605
<u>Recruit</u>										
135–157	New	20,280	9,474	54,420	4,015	0	1,776	0	1,959	4,514
	Old	81,057	53,397	51,453	46,562	24,864	8,898	2,499	2,965	11,125
<u>Post-recruit</u>										
> 157	New	935	843	0	0	0	0	0	0	0
	Old	2,773	1,600	2,751	627	0	0	863	0	0
Legal Males		105,045	65,314	108,624	51,204	24,864	10,674	3,362	4,923	15,639
Total Males		1,735,571	1,627,583	1,045,602	996,449	453,636	364,639	174,817	1,520,773	901,861
<u>Females</u>										
Juveniles		1,128,480	613,447	403,803	609,771	216,771	154,775	19,665	1,112,632	400,146
Mature Females		516,811	808,266	296,547	211,894	106,640	339,719	112,506	500,129	547,281
Total Females		1,645,291	1,421,713	700,350	821,665	323,411	494,494	132,172	1,612,761	947,427

^a Biennial survey schedule adopted. No surveys conducted in 1996, 1998, 2000, 2002, and 2004.

^b New shell crab are less than year since its last molt with few or no scratches or growth of epifauna (such as barnacles) on the shell.

^b Old shell crab have skipped a molt as indicated by scratches or growth of epifauna (such as barnacles) on the shell, worn spines and perhaps missing limbs.

Table 4.—Commercial king crab harvests from the Prince William Sound Management Area, 1960–1995.

Season ^{a,b,c}	Vessels	Landings	King Crab Harvest Biomass (lbs.)				Avg. wt. Golden King
			Red	Blue	Golden	Total	
1960						246,965	
1961						236,081	
1962						31,478	
1963						43,569	
1964						14,028	
1965						5,500	
1966						11,000	
1967						41,800	
1968						200,000	
1969						48,100	
1970						94,300	
1971						144,200	
1972						296,200	
1973						207,916	
1974						85,379	
1975						53,423	
1976–77						17,087	
1977–78						86,595	
1978–79						114,000	
1979–80	18	109	52,026	13,662	0	65,688	
1980–81	14	65	32,433	7,282	20	39,735	No Data
1981–82	11	43	25,358	5,634	0	30,992	
1982–83	31	187	30,809	10,433	147,016	188,258	9.7
1983–84	18	69	16,467	5,324	50,535	73,226	8.8
1984–85	4	14	235	closed	40,232	40,467	No Data
1985–86	4	11	closed	closed	51,800	51,800	5.8
1986–87	4	11	closed	closed	65,674	65,837	6.1
1987–88	4	15	closed	closed	68,270	68,270	6.6
1988–89	5	14	closed	closed	48,442	48,442	6.6
1989–90	0	0	closed	closed	closed	0	
1990–91	^d	^d	closed	closed	^d	^d	No Data
1991–92	^d	^d	^d	^d	^d	^d	No Data
1992–93	0	0	closed	closed	closed	0	
1993–94	0	0	closed	closed	closed	0	
1994–95	^d	^d	closed	closed	^d	^d	

^a 1995–96 to 1999 Seasons closed by emergency order.

^b Seasons closed by regulation effective August 1999.

^c Catch not reported by species prior to 1979–80 season.

^d Data confidential under AS 16.05.815.

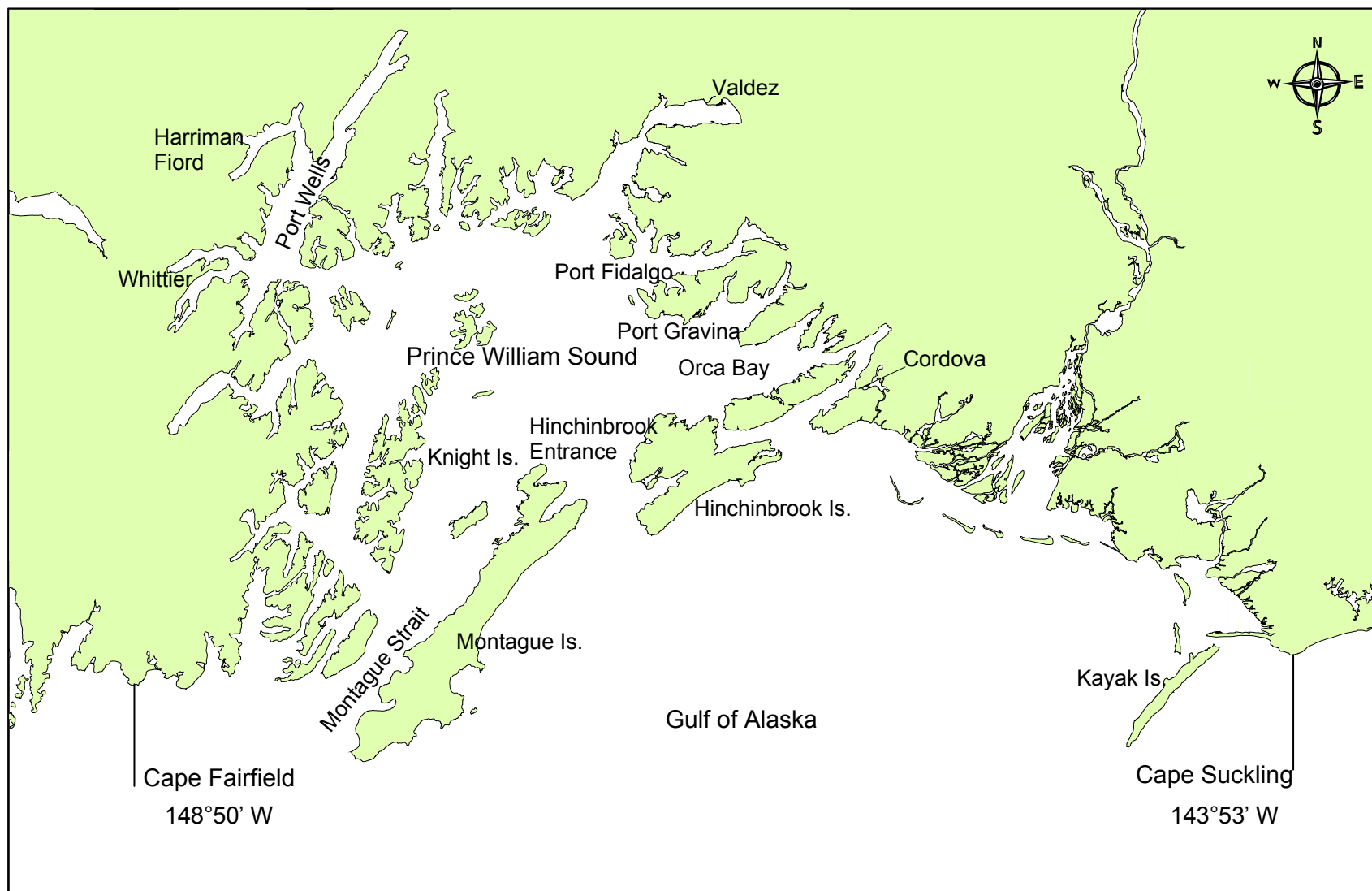


Figure 1.—Prince William Sound shellfish registration area.

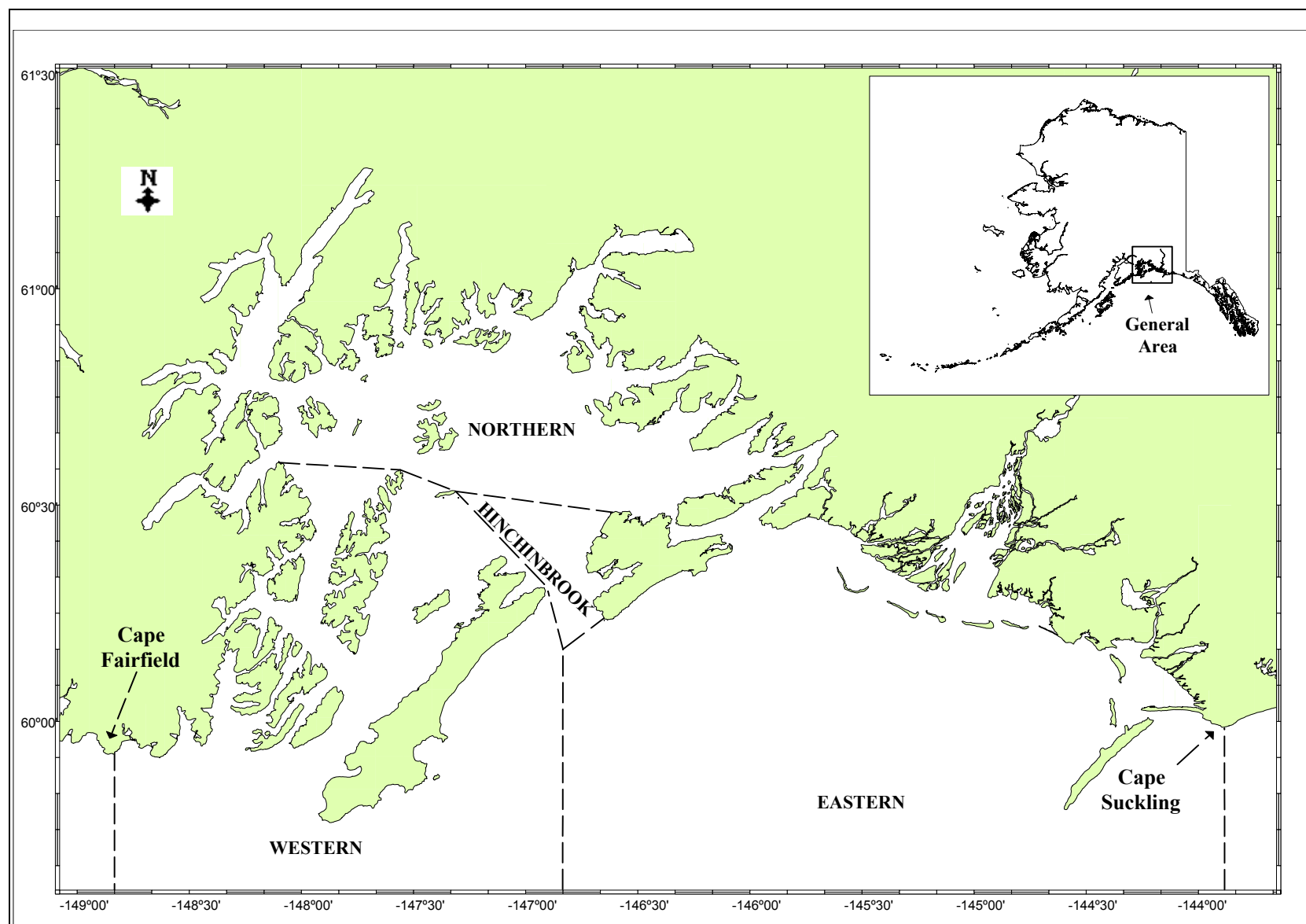


Figure 2.—Prince William Sound Tanner crab fishing districts.

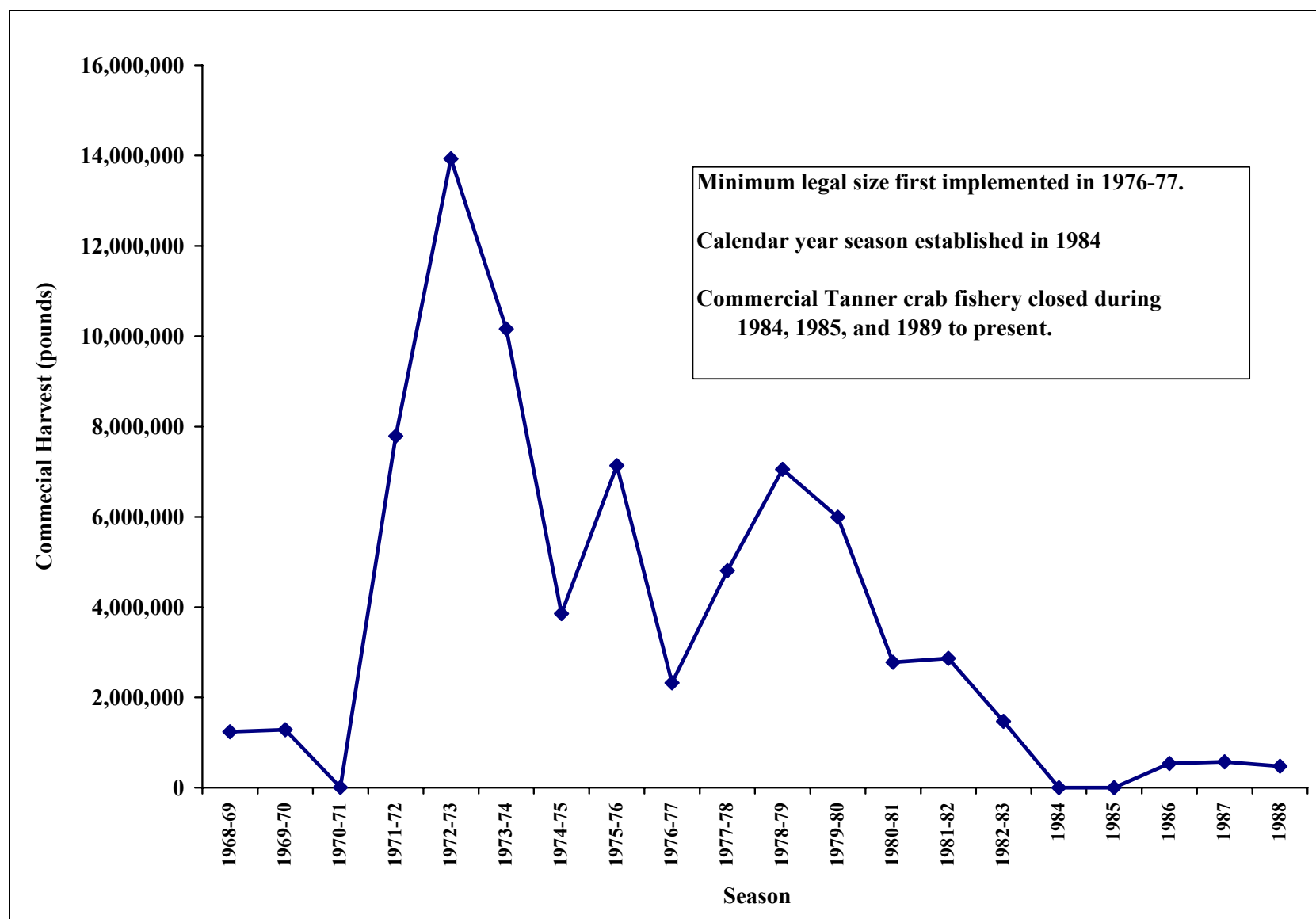
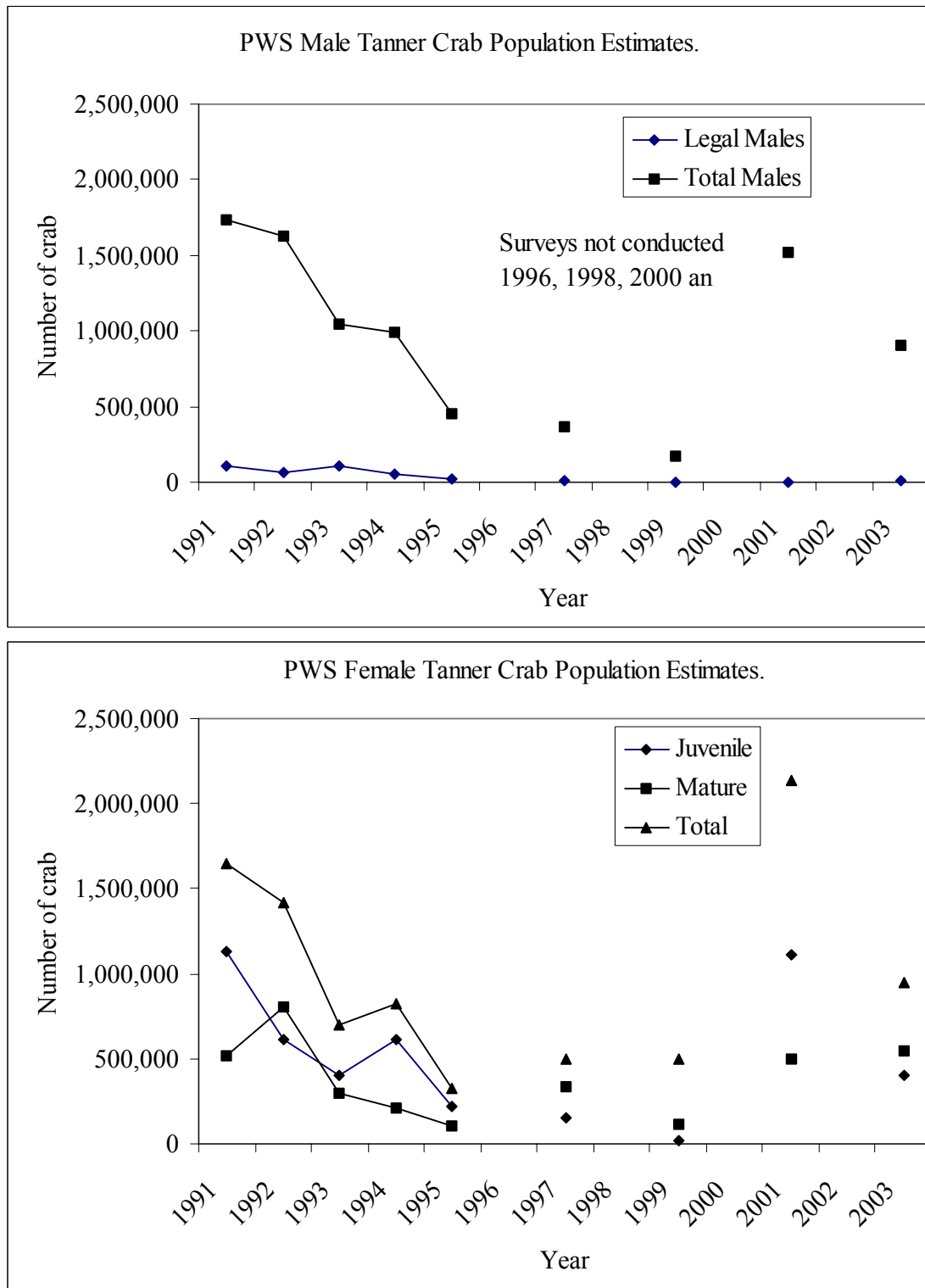
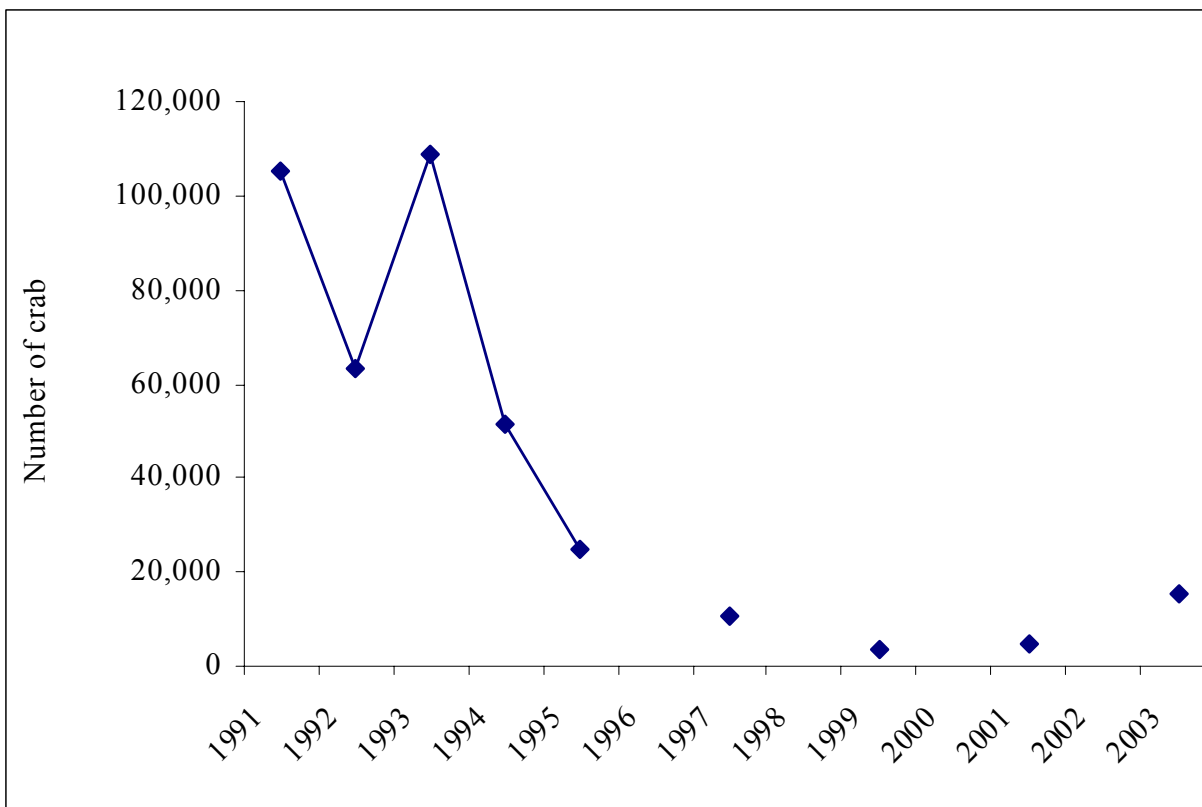


Figure 3.—Commercial Tanner crab harvests from the Prince William Sound Area, 1968–1988.



Note: Surveys not conducted in 1996, 1998, 2000, and 2002.

Figure 4.—Tanner crab population estimates from Prince William Sound trawl surveys, 1991-2003.



Note: Surveys not conducted in 1996, 1998, 2000, and 2002.

Figure 5.—Legal male Tanner crab population estimates from Prince William Sound trawl surveys, 1991–2003.

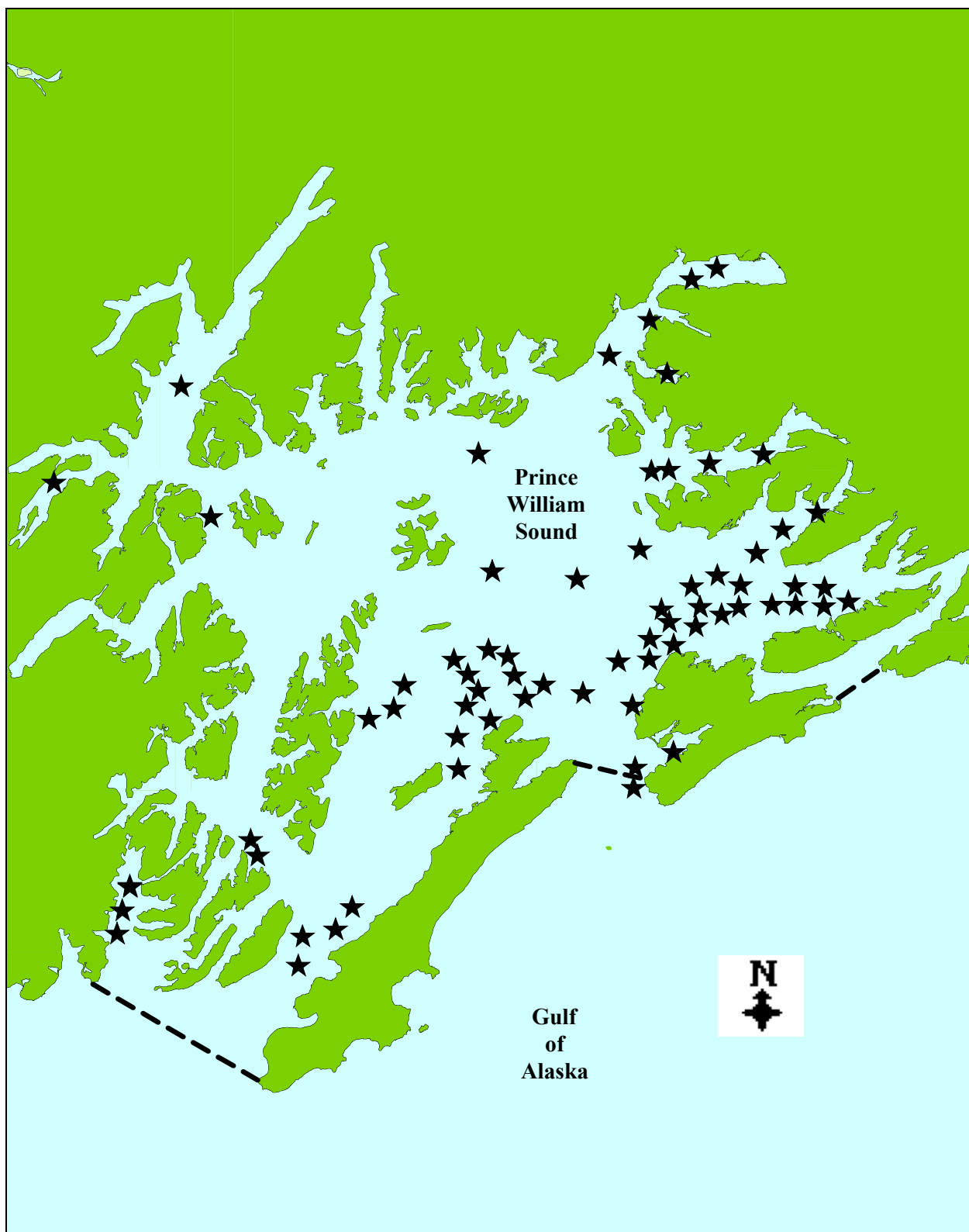


Figure 6.—Prince William Sound bottom trawl survey locations in 1999.

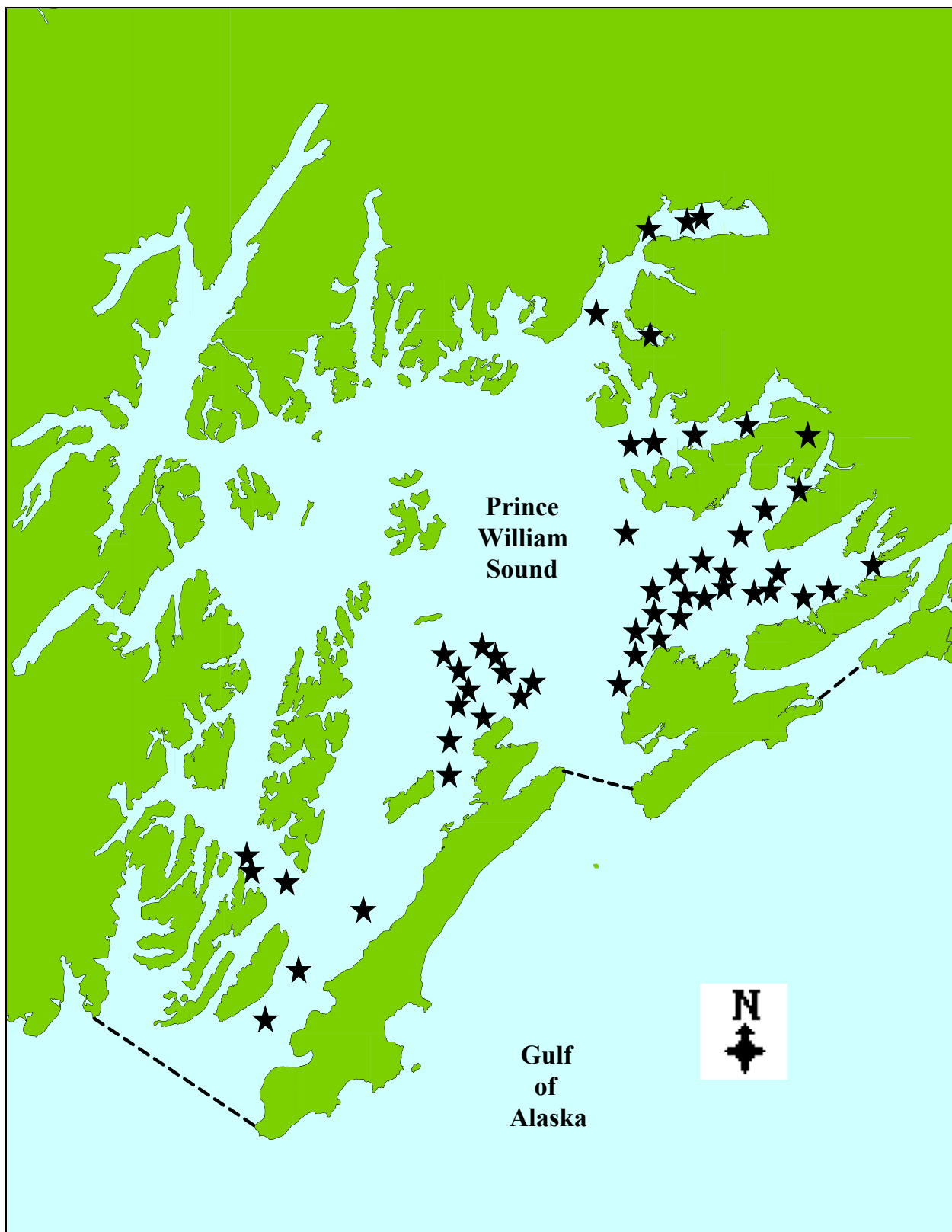


Figure 7.—Prince William Sound bottom trawl survey locations in 2001.

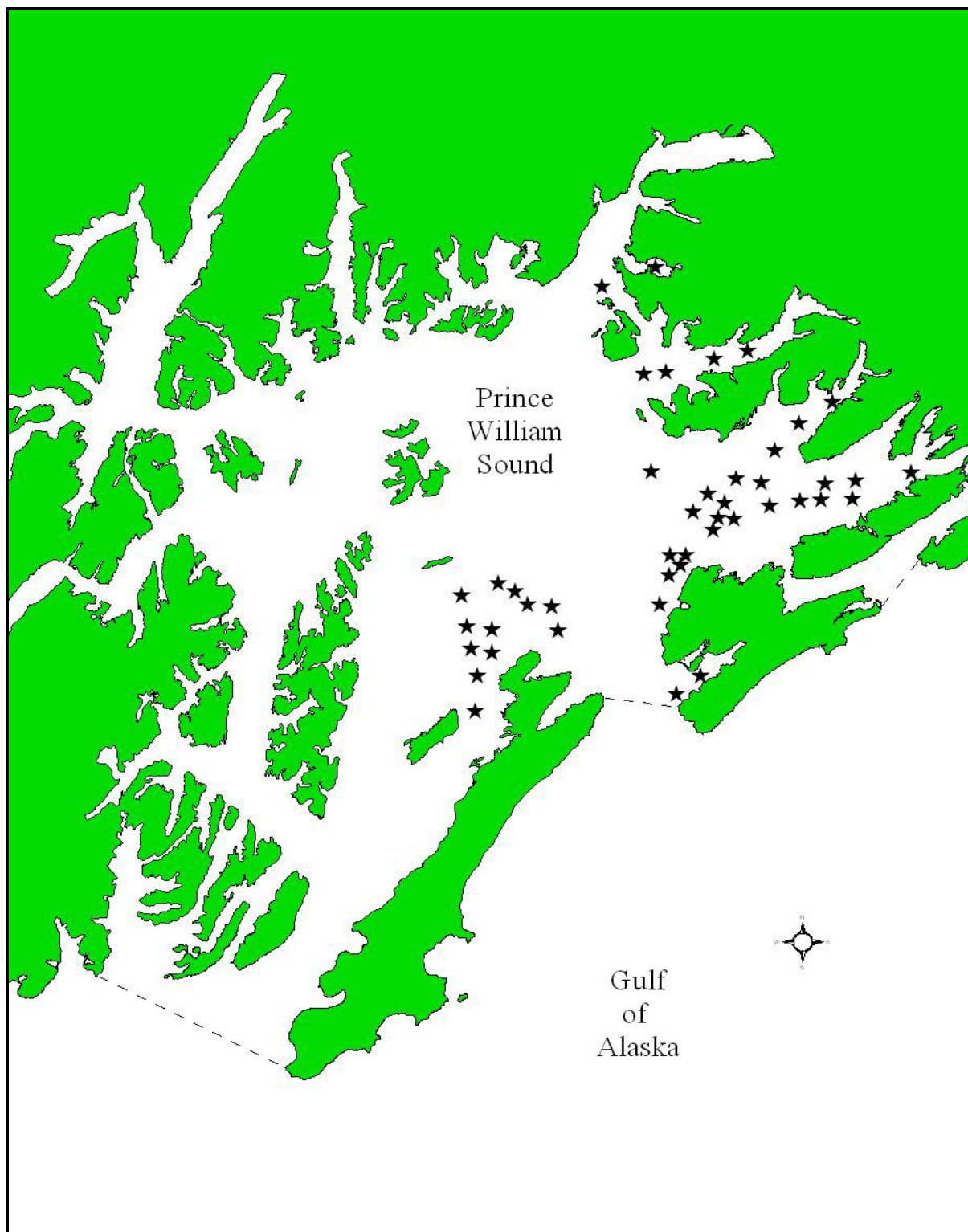


Figure 8.—Prince William Sound bottom trawl survey locations in 2003.

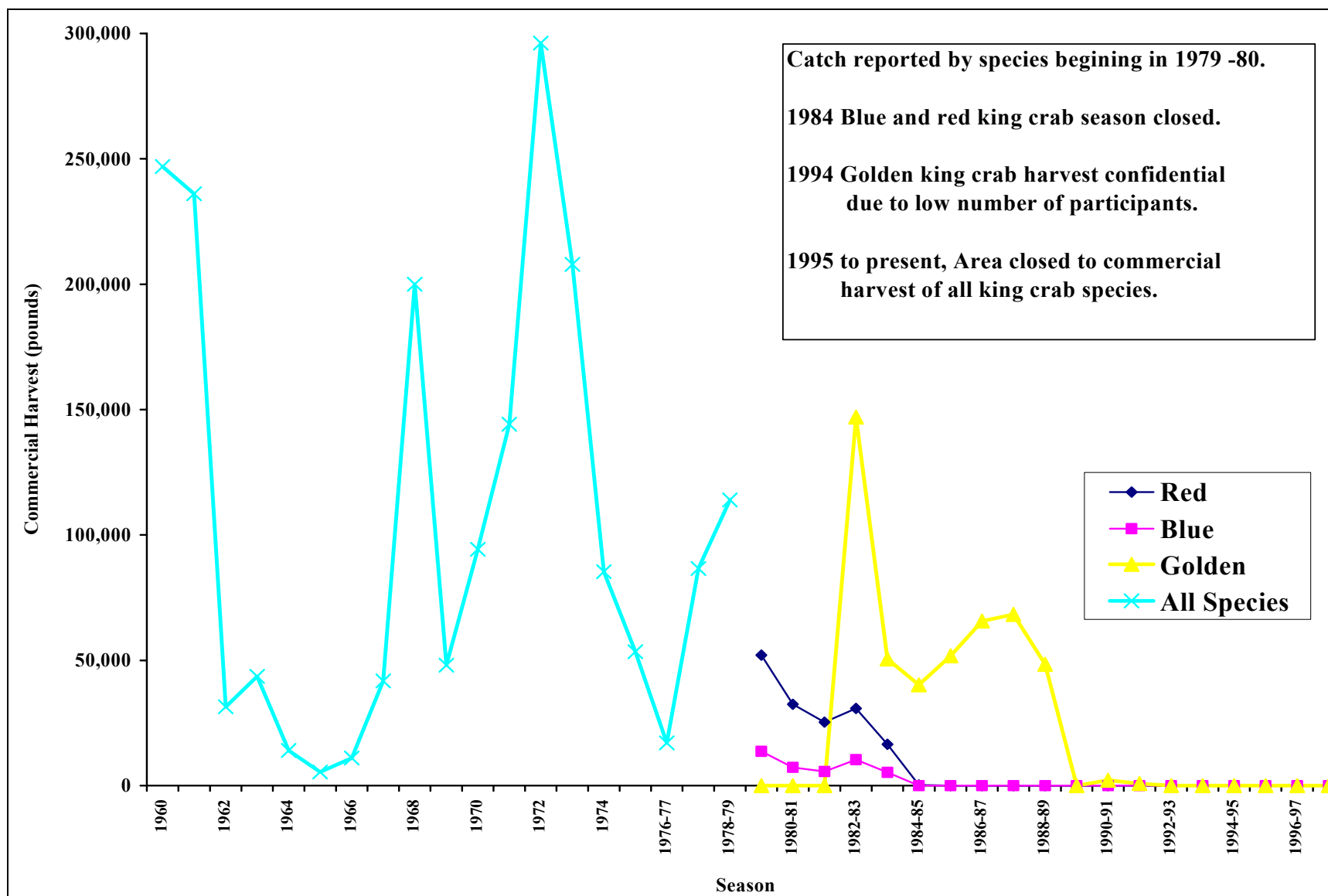


Figure 9.—Commercial king crab harvests from the Prince William Sound Management Area during 1960–1995.

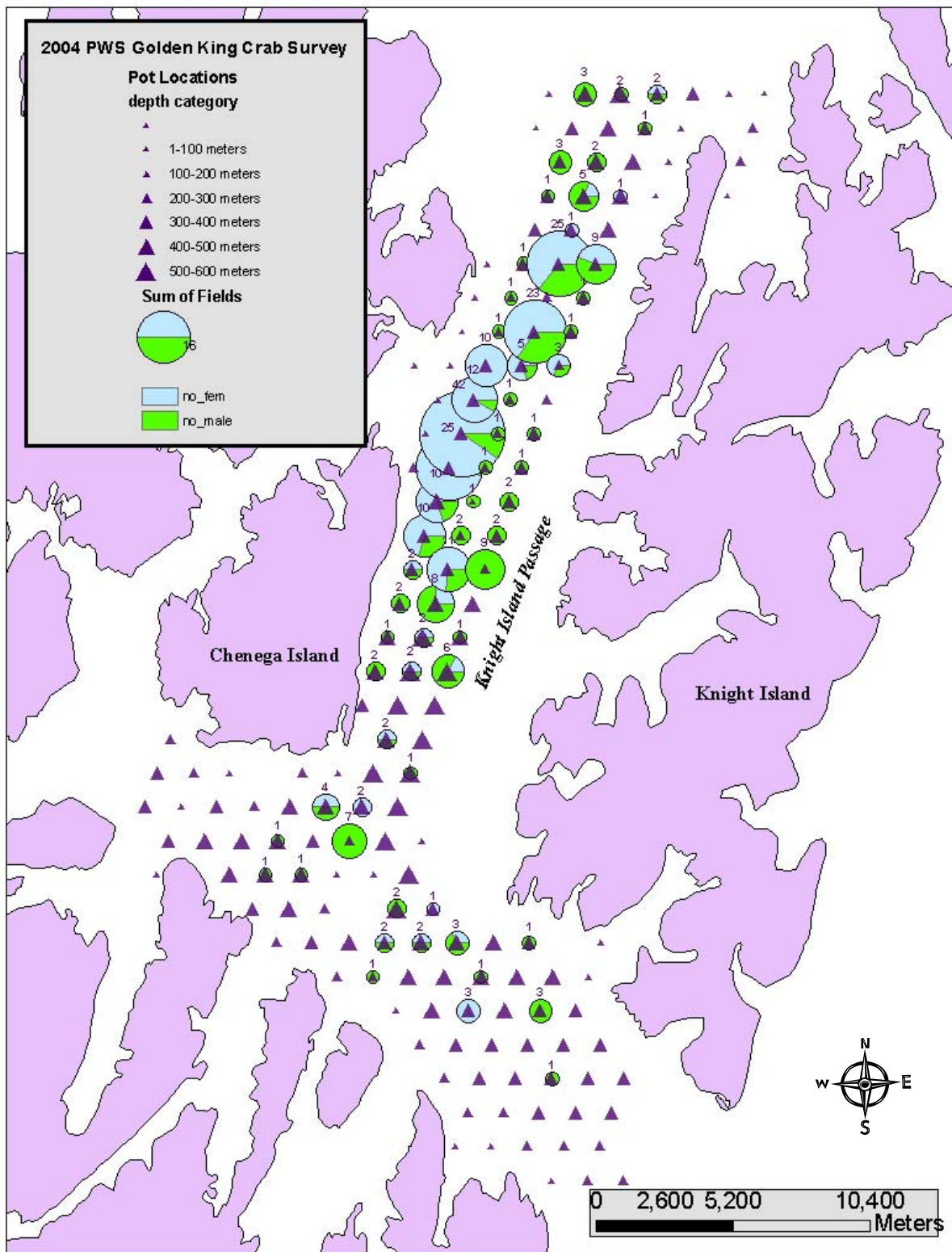


Figure 10.—Golden king crab pot survey stations and catch by sex from the 2003 stock assessment.